

WHAT IS CLAIMED IS:

1. A semiconductor device comprising:

a semiconductor substrate having an upper surface,
a lower surface opposing the upper surface, sides
extending between the upper and lower surfaces, and
a plurality of outer connection terminals formed on
the upper surface; and

a seal film covering the upper surface of the
semiconductor substrate, exposing the outer connection
terminals at one surface, and covering the sides, to
at least half the thickness of the semiconductor
substrate.

2. The semiconductor device according to claim 1,
wherein the seal film covering the upper surface of the
semiconductor substrate is substantially flush with the
upper surfaces of the outer connection terminals.

3. The semiconductor device according to claim 1,
wherein the seal film covers the sides in entirety.

4. The semiconductor device according to claim 1,
wherein the seal film covers the sides to half the
thickness of the semiconductor substrate.

5. The semiconductor device according to claim 4,
wherein the faces of the seal film that covers the
sides of the semiconductor substrate are substantially
flush with the sides of that part of the semiconductor
substrate which are not covered with the seal film.

6. The semiconductor device according to claim 1,

wherein the seal film cover all surfaces and sides of the semiconductor substrate.

7. A semiconductor device comprising:

a semiconductor substrate having an upper surface and sides;

a plurality of connection pads formed on one surface of the semiconductor substrate;

an insulating film having openings exposing the connection pads and covering said upper surface of the semiconductor substrate;

wiring connected to the connection pads and provided on the insulating film;

pillar-shaped electrodes connected to the wirings and having top surfaces; and

a seal film exposing the pillar-shaped electrodes at the top surface and covering the upper surface of the semiconductor substrate and portions of the sides extending to at least half the thickness of the semiconductor substrate from the top surface.

8. The semiconductor device according to claim 7, wherein the seal film covering the upper surface of the semiconductor substrate is substantially flush with the top surfaces of the pillar-shaped electrodes.

9. The semiconductor device according to claim 7, wherein the seal film covers the sides of the semiconductor substrate in entirety.

10. The semiconductor device according to claim 7,

wherein the seal film covers all surfaces and sides of the semiconductor substrate.

11. A method of manufacturing a semiconductor device comprising the steps of:

5 preparing a semiconductor wafer having an upper surface, a lower surface opposing the upper surface, sides extending between the upper and lower surfaces, and a plurality of outer connection terminals formed on the upper surface;

10 making trenches in those parts of the semiconductor wafer which lie between chip-forming regions thereof, each trench extending at least half the thickness of the semiconductor wafer from the upper surface;

15 forming a seal film on the upper surface of the semiconductor wafer, filling the trenches and exposing the outer connection terminal at one surface; and

20 cutting the seal film along the trenches, removing those parts of the seal film which have a smaller width than the trenches.

12. The method according to claim 11, further comprising a step of adhering a dicing tape to the semiconductor wafer before the trenches are made in the semiconductor wafer.

25 13. The method according to claim 12, further comprising a step of adhering a support tape to an upper surface of the seal film after the seal film

is cut, and a step of peeling the dicing tape from the semiconductor wafer.

14. The method according to claim 11, further comprising a step of polishing a lower surface of the semiconductor wafer after the seal film is cut, thereby
5 reducing the thickness of the semiconductor wafer.

15. The method according to claim 11, another seal film is formed on a lower surface of the semiconductor wafer before the seal film is cut.

10 16. A method of manufacturing a semiconductor device, comprising the steps of:

preparing a semiconductor wafer having an upper surface and sides and having a plurality of connection pads on the upper surface;

15 forming an insulating film having openings exposing the connection pads, thereby covering the upper surface of the semiconductor wafer;

forming wirings on the insulating film, said wirings connected to the connection pads;

20 forming pillar-shaped electrodes on the wirings; and

forming a seal film exposing the pillar-shaped electrodes at one surface and covering the upper surface of the semiconductor wafer and the part of the
25 sides extending to at least half the thickness of the semiconductor wafer from the upper surface.

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